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Automated Verifier For Pharmacy

This application is a continuation in part of U.S. patent application serial number 09/715,439, filed on November 16, 2000, now pending,

Field Of The Invention

The present invention relates to an automated system for verifying that the correctly prescribed drugs have been disbursed from a pharmacy. In particular, a customer's prescription order is coded with a wireless tag that identifies the prescribed drug to be disbursed. Similarly, supply containers within the pharmacy are coded with a wireless tag that identifies the particular drug within each supply container. A computer system monitors these tags during disbursement of the drug from the supply container to the customer's prescription order and flags the discrepancy if the drug in the supply container differs from the prescribed drug.

Background Of The Invention

A typical local retail pharmacy fills thousands of prescription orders per week. Moreover, as the general population ages and new beneficial drugs are introduced, prescription order volumes to be filled at retail pharmacies are expected to double within the next few years. This present and expected increase in order volume places enormous pressure on pharmacists and other pharmacy workers, who strive to fill each order efficiently, accurately and quickly.

Despite the increasing workloads on workers in the pharmacy, it is critical that each prescription order be filled with the correctly prescribed drug. However, occasionally errors still arise. A particularly error prone step in the prescription filling process arises when a worker disburses a drug from a common supply container within the pharmacy to a smaller container in which the customer's prescription order is to be placed on into a counting device.

Accordingly, pharmacists and pharmacy workers receive extensive training, have implemented procedures, and have developed equipment aimed at minimizing the likelihood of the wrong drug being disbursed to a customer. For example, both supply containers and containers in which a customer's prescription order are to be placed require labels that clearly identify the drugs either in them or to be placed in them.

Similarly, the U.S. Government has assigned every drug disbursed by a pharmacy a unique seven-digit code number, which is commonly referred to as a National Drug Code ("NDC") number. The NDC number is required on both the supply containers within the pharmacy and on prescription labels affixed to the container in which the customer's prescription order is to be placed. A common step in the prescription filling process is to verify that the NDC number on the supply container is the same as the NDC number on the prescription label. This step within a pharmacy is commonly known as "NDC Verification."

These labeling and numbering systems allow workers to detect and correct the majority of errors. However, these systems require workers to manually perform repetitive tasks over long periods of time and while remaining visually astute. Accordingly, there remains some risk of workers inadvertently overlooking a mismatch between the labels and NDC numbers on a supply bottle with those listed on a prescription label. Accordingly, despite these procedures errors still arise.

More recently, some pharmacy vendors have attempted to improve the NDC Verification step by bar-coding the NDC numbers on both supply containers and prescription labels. A worker then uses a barcode reader to scan these NDC numbers and determine if they match. Unfortunately, this process requires a pharmacy worker to physically scan the barcodes on both the supply container and the prescription label with either an handheld or fixed barcode scanner. In practice, some workers inadvertently neglect to perform this task, rendering the barcodes useless.

Summary Of The Invention

Accordingly, despite the known pharmacy methods and devices for verifying that a correct drug has been disbursed from a pharmacy, there remains a need for a cost effective, easy to use, and automatic verification system that supplements the traditional training and procedures of a pharmacy worker, but that doesn't rely on extensive manual manipulation or visual astuteness of that pharmacy worker. In addition to other benefits that will become apparent in the following disclosure, the present invention fulfills these needs.

The present invention is a drug filling automated verification system that includes a plurality of wireless tags that are readable by a computer system. Each tag travels with a container within the pharmacy. These containers include supply containers that contain drugs to be disbursed and prescription containers in which a customer's prescription order is to be placed. Each tag includes a unique drug identification code, such as an NDC number, that is wirelessly readable by the computer system that automatically monitors these tags during disbursement of the drug from the supply container to the customer's prescription order and flags the discrepancy to a pharmacy worker if the drug in the supply container differs from the prescribed drug.

In a preferred embodiment, the tags traveling with prescription containers include transducers, such as lights or a speaker, that activate when the drug in the supply container doesn't match the customer's prescribed drug. The drug code can be written to memory in the tags, or correlated by the computer system to associate it with unique fixed code broadcast by the tag.

More preferably, the drug filling automated verification system also serves as a tracking and monitoring system. The tag of items to be tracked within the pharmacy are preferably a transceiver with a transducer operably secured thereto, such as a conventional Radio-Frequency Identification ("RFID") tag with one or more lights or speakers connected thereto. The computing system includes a plurality of

transceivers, one spaced at each key locations throughout the pharmacy to detect the presence of each tag positioned near a particular transceiver of the computing system. The detected locations are compiled via the computer system and associated with item to be tracked, such that at any given time, the location of the items to be tracked within the retail pharmacy can be quickly and easily determined.

Additional objects and advantages of the present invention will be apparent from the detailed description of the preferred embodiment thereof, which proceeds with reference to the accompanying drawings.

Brief Description Of The Drawings

Fig. 1 is an isometric view of an interrogation station showing a supply container and container in which a customer's prescription order is to be placed in accordance with a preferred embodiment of the present invention.

Fig. 2 is a schematic diagram of an exemplar interrogation between a supply container and a customer's prescription order in accordance with a preferred embodiment of the present invention.

Fig. 3 is a schematic view of a drug filling automated verification system in accordance with a preferred embodiment of the present invention.

Fig. 4 is a block diagram of an exemplar pharmacy prescription order filling system having an automated verification system in accordance with a preferred embodiment of the present invention.

Fig. 5 is a block diagram of an exemplary computer system in accordance with a preferred embodiment of the present invention.

Fig. 6 is a block diagram of an exemplary application program in accordance with a preferred embodiment of the present invention.

Detailed Description Of Preferred Embodiments

An automated pharmacy verification system 10 is disclosed in Figs. 1-6.

Referring to Fig. 2, the verification system 10 includes a plurality of tags 16 that are wirelessly readable by a computer system 20. Each tag 16 travels with a

container within the pharmacy. These containers include supply containers 31 that contain drugs to be disbursed and prescription containers 33 in which a customer's prescription order is to be placed. One tag 16a of tags 16 is operably secured to a supply container 31, and another tag 16b is operably secured to a prescription container 33 as shown in Figs. 1 and 2.

Each tag 16a, 16b includes a unique drug identification code, such as an NDC number, that is wirelessly readable by the computer system 20 that automatically detects and monitors these tags through one or more tag readers 18 positioned near an interrogation zone 35 (Fig. 1) used during disbursement of the drug from the supply container to the customer's prescription order. The computer system 20 or tag 16a flags the discrepancy to a pharmacy worker if the drug in the supply container differs from the prescribed drug. Each of the preferred components of this system are discussed in greater detail below:

A. Wireless Drug Identification Tags and Tag Readers

FIG. 2 discloses exemplar tags 16 and related components to wirelessly detect the identification of a drug within a container and transmit that information to a computer system. Preferably, the tags are known devices that can locate objects through electromagnetic interrogation of a spatial region to determine the presence of an object. One such system is disclosed in U.S. Pat. No. 6,057,756 to Engellenner, the disclosure of which is hereby incorporated by reference.

In general, the tags 16 are an electromagnetic antenna and/or signal receiver which responds either passively or actively to announce the presence (or absence) of an object within a controlled region defined by a broadcasted electromagnetic interrogation signal. Preferably, each tag 16 includes a coding mechanism for uniquely identifying it with respect to other tags in the system and identifying a particular drug associated with the container to which it is attached. This drug code can be written to memory in the tags, or correlated by the computer system to associate it with unique fixed code broadcast by the tag.

As shown in Fig. 2, tag 16b can include a transmitter 86 for transmitting a signal 67 and internal circuitry such as a processor 48, power source 50 and memory 52 which contains a unique identifier for that tag and a code for identifying a particular drug associated with the container 31 to which the tag 16a is attached.

Tag 16a may be a transceiver 60 with one or more transducers 17 operably secured thereto, such as for example, a conventional Radio-Frequency Identification ("RFID") tag with one or more lights 17a (Fig. 1) or audio speakers 17b (Fig. 1) connected thereto. Tag 16a can be either passive or active. In the passive mode, the tag circuitry accumulates and then returns a signal, if the interrogation signal matches a predefined code sequence stored in memory in the tag's circuitry. In an active mode, each tag 16a further includes a power source 70 that assists with signal amplification, detection and/or wave forming. As shown in Fig. 2, each tag 16a can include a receiver 72, a power supply 70, a rectifier/detector 76 and wave former 78, a comparator 80 with associated memory 52, a modulator/encoder 82, a controller 84, the transducers 17, and a transmitter 86.

The tag reader 18 is preferably one or more interrogation signal generators, or search beacons, that are simple electromagnetic field generators (e.g., radio transmitters or magnetic field coils), which cause specific tags to respond. The receiver portion 66 of the tag reader 18 can induce a coded signal detector that senses the transponder signal 64 and transmitter signal 67 and correlates them with a stored code to identify that the tags 16a, 16b are present in a particular interrogation zone. More preferably, the tag readers 18 are transceivers that both transmit an interrogation signal 65 and receive a response signal 64, echo, or otherwise send a field perturbation, indicating the presence of a specified tagged item within the interrogation region. Each tag reader's 18 signal 65 is limited to a particular area within the retail pharmacy, thereby allowing the detected signal to indicate the location of the prescription order within the pharmacy.

Preferably, a plurality of fixed or handheld transceivers, which are collectively referred to as tag readers 18 herein, are spaced apart from each other and positioned at

desired locations within the pharmacy 14 to define spaced apart interrogation zones 35 within the pharmacy. Each tag reader 18 includes a front-end transmitter 62 that generates a digitally encoded signal 65. Preferably, the signal 65 is chosen to facilitate a response from only one uniquely coded tag 16.

Alternatively, the computer system 20 can also use conventional triangulation techniques to determine the location of each tag 16 within the pharmacy and define individual verification zones a defined distance around each tag 16a traveling with a prescription. In which case, only two spaced-apart tag readers 18 need be placed within the pharmacy. Alternatively, using quasi-sonar-type locating techniques, a single tag reader 18 could be used to determine the location of each tag 16 within the pharmacy and define appropriate interrogation zones around tags 16a.

During use, an interrogation signal 65 is received by the receiver portion 72 and decoded by the rectifier/detector 76. The rectifier/detector 76 generates a waveform which can be returned to the interrogating tag reader 18 via transmitter 86, if the encode interrogation signal correlates with a sequence stored in memory 52. The controller 84 can activate one or more transducers in response to a detected command signal 64.

Preferably, the transducer17 is either a light 17a (Fig. 1) or audio speaker 17b (Fig. 1). More preferably, there are a plurality of transducers 17 that can be individually activated on each tag. For example, there can be three lights of different colors (i.e. red, yellow, and green), which can be activated either alone or in combination to identify the status of that prescription order. With a different status being denoted by a different transducer being activated.

As best shown in Fig. 1 and 2, when tag 16a, which is attached to a supply container 31 and tag 16b, which is attached to a prescription container 33, are in the same interrogation zone of a tag reader 18, the computer system 20 automatically detects their presence in the zone 35 and determines the identity and drug code from each tag. If the codes match, the worker is placing the correct drug from the supply container into the correct prescription. If the codes do not match, it is likely that

wrong drug is being placed into the prescription order. In response, the computer system flags the discrepancy to a pharmacy worker. This flagging can include displaying the discrepancy on a computer screen, or activating the transducer on tag 16a, such as lighting a light or sounding a tone.

B. Prescription Order Tracking Through Pharmacy

Tags 16 with transducers 17 may also be used to track the location of the prescription container as it travels throughout the pharmacy 14. For example and referring to Fig. 3, a prescription order 12 is presented to the pharmacy 14 and assigned an identification tag 16 with one or more transducers 17 thereon. Tag readers 18 defining a plurality of interrogation zones are positioned at key locations throughout the pharmacy 14 and in communication with the computer system 20 having a display 22, such that the movement of the prescription container 12 throughout the pharmacy 14 automatically detects and records the location of the tag 16 without further worker input. Accordingly, a worker can easily determine the location of the prescription container 12 within the pharmacy by entering commands in the computer system 20 with a user input device such as a keyboard 120 to display the location of the prescription container 12 on the computer display 22.

Each tag reader 18 is placed in communication with the computer system such that information regarding the customer, his prescription container position, the identify of the prescribed drug, and the status of his order can be readily displayed on the computer display 22, and thereby facilitate location of the prescription container 10 within the pharmacy 14.

Preferably, the identification tags 16 are attached to the prescription label, detachably secured to the prescription container, or rigidly secured to a carrier 46 (Fig. 1) containing these documents and other materials related to filling the prescription. The tags themselves can be either rigidly or detachably secured to the prescription container. For example, the tags can be directly secured to the prescription with adhesive or secured within a prescription lid. Also, the tags can be secured to a fastener, such as a paperclip, that is detachably secured to the prescription container.

C. Pharmacy Prescription Order Filling Procedure

Referring specifically to Fig. 4, an exemplary pharmacy, which is preferably a retail pharmacy, prescription order filling procedure is disclosed. In step P1, a prescription order, which could include a written prescription form, a renewable prescription label, or any other tangible medium documenting a request for a prescription by a health care provider is presented to the pharmacy either in person, via facsimile, via phone, or via a computer transmission, such as e-mail. A pharmacy worker then reviews the prescription order and attaches a unique tag 16a (Fig. 1) to it that is readable by a tag reader 18 (Fig. 1) to determine its location within the pharmacy 14.

As shown in Step P2, the pharmacy worker then determines if the prescription order is for a new prescription. If so, the pharmacy worker conducts an initial review (Step P3) which includes checking the available inventory for the prescribed drug (Step P4), determining if there is available insurance (Step P7) and if required, obtaining approval from the insurer and preparing the label and necessary billing and information disclosure paperwork (Step P8).

If the prescription is not new, the pharmacy worker determines if it is refillable (Step P5). If so, the pharmacy worker then conducts the initial review (Step P3) as previously described. If not, the pharmacy worker contacts the prescribing health care provider (Step P6) to determine if the prescription may be refilled. If the health care provider approves of the refill, the pharmacy worker will then conduct the initial review (Step P3) as previously described. If not, the customer will be informed (Step P12). If the health care provider is not available, the prescription order to placed in a holding area until the health care provider is contacted (Step P13), and the customer is informed of this status.

Regarding Step P4, if the inventory is not in stock, the pharmacy worker typically informs the customer and offers the customer an opportunity to special order the prescribed drug (Step P14). If there is only a partial amount of the prescribed drug in stock, the pharmacy worker will typically initiate a procedure for filling only a

partial order (Step P15). This procedure typically includes preparing additional paperwork to alert the customer that only a partial order has been filled, and ordering additional quantities of the prescribed drug.

Regarding Step P7, if the insurance coverage is denied, the prescription order is typically held in an area pending the customer being contacted to request authorization to proceed (Step P16). If the insurer cannot be contacted, the pharmacy has the option to either fill the prescription and alert the customer upon pick-up, or hold the prescription order pending a response from the insurer (Step P17).

After the initial review is complete, the prescription order and related paperwork are presented to a technician for filling (Step P9). The technician fills the prescription order and attaches the label. The technician then presents the filled prescription order and related paperwork to a registered pharmacist for verification (Step P10). This verification step also includes a pharmacy worker visually comparing the information on the supply container containing the dispersed drug with the information on the prescription container and positioning both containers in the same interrogation zone to allow the computer system to automatically verify that the proper drug was disbursed as previously described.

Following verification, the filled prescription is placed in a storage area pending customer pick-up (Step P11). When a customer picks-up the filled prescription, the pharmacy worker complies with applicable customer notice requirements, and obtains the customer's signature (also called "signature capture") confirming that they have received such notice (if applicable) and that they have received the filled prescription (Step P18).

Tag readers 18 defining interrogation zones can be placed at numerous drug dispensing areas around the pharmacy to automatically verify whether a drug in a supply container within the interrogation zone matches the drug to be placed in a prescription container positioned within that zone.

Alternatively, the computer system can also use conventional triangulation quasi-sonar-type locating techniques to determine the location of each tag 16 within

the pharmacy and define individual verification zones 35 a defined distance around each tag 16a traveling with a prescription container 33 rather than defining the verification zones 35 around each tag reader 18.

D. Pharmacy Interrogation and Tracking Zones

In practice and referring specifically to Fig. 3, it is more efficient to perform the various steps noted above at spaced apart locations, or zones, throughout the pharmacy. For example, prescription order intake (Step P1 of Fig. 4) and initial review (Step P3 of Fig. 4) can be performed at location 21 (Fig. 3). Label printing and data entry (Step P8 of Fig. 5) could be accomplished at location 27 (Fig. 3). Prescription orders waiting from some form of call back either from the customer, the insurer, or the health care provider could be placed at location 28 (Fig. 3). Orders waiting to be filled could be placed at location 23 (Fig. 3), orders waiting pharmacist review and approval could be place at location 25 (Fig. 3), and approved filled prescription orders could be stored at location 30 (Fig. 3). Obviously, additional zones 24 could be added to accommodate a particular pharmacy's practices and procedures.

Preferably each station includes a tag reader 18 in communication with the computer system 20 for automatically detecting the arrival of the tag 16 attached to the prescription order 12 as it enters each location. More preferably, the tag reader 18 detects both the arrival of the tag 16 in that station, and the departure of that tag 16 from that station, with the time interval at that station being determined and recorded therefrom.

Each tag reader 18 is preferably fixed at a particular location so that detecting the presence of a tag near the device also automatically indicates the location of that tag 16 within the pharmacy. The tag readers 18 can be rigidly mounted to a work area or station, or portable (i.e. handheld) devices that are operably connected to the station so that it can indicate a location within the pharmacy of a detected tag. Such portable devices facilitate scanning of prescription orders that are compiled in bulk, such as container of filled prescriptions where each prescription order in the container has a unique tag 18. Such a bulk container full of prescription order could arrive into the

pharmacy from an off-site prescription filling station. In situations where the tag reader can simultaneously detect and record the location of multiple prescription order, a pharmacy worker can wave the tag reader 18 over the container to record the location of all prescription orders in the container.

Tag readers 18 can also be placed at key drug filling stations, such as near scales, counting machines, dispensers and the like all of which have a container for receiving a drug and usually require periodic refilling from a supply container 31. A tag 16a or 16b can be operably secured to such containers such that the dispensing of a drug either from a supply container 31 to the scale, counting machine, dispenser or the like, can be automatically verified by the verification system 10. Similarly, the dispensing of a drug from the scale, counting machine, dispenser or the like to a prescription container 33 in that same interrogation zone can also be automatically verified.

E. Storage Bin

Space and efficiency can be optimized by storing filled or prescription orders 12 to be held for pick-up into a common storage bin 30. As best shown in Fig. 3, the storage bin 30 includes a plurality of cubbies 32, with each cubby 32 being sized to receive a prescription order 12 and associated filled prescription. Each cubby is uniquely identified 34, such as by being individually numbered, and includes a tag reader 18 of determining whether a particular tag 16 is received within it. Each tag reader 18 is in communication with the computer system 20.

When a prescription order 12 is filled, the prescription order 12 and filled prescription are simply inserted into an available cubby 32. Accordingly, the tag reader 18 associated with that cubby 32 sends a signal to the computer system 20 denoting the particular location and cubby number where the prescription order 12 and filled prescription are held. When a customer arrives to pick-up his or her filled prescription, the worker enters the customer's identifying information into the computer system 20, and the particular bin number of the cubby containing the prescription order 12 and filled prescription or the current location in the filling

process is displayed. The worker then locates and removes the filled prescription from the identified cubby and presents it to the customer.

The removal of the prescription order 12 from that particular cubby 32 is detected by the tag reader 18 and reported to the computer system 20. The tag 16 can remain affixed to the prescription order 12 when filed, thereby allowing it to be easily located in the future. Alternatively, the tag 16 may be reused with a new incoming prescription order.

F. Computer System

Those skilled in the art will appreciate that an exemplary embodiment of the present invention relies on and incorporates several common features of modern personal computers. The general use, operation, and construction of a computer system is known and has been disclosed in numerous patents such as U.S. Pat. No. 5,818,447 to Wolf et al. and U.S. Pat. No. 5,752,025 to Shakib et al..

Referring to FIG. 5, the following discussion is intended to provide a brief, general description of a suitable computing environment in which the invention may be implemented. Although not required, the invention will be described in the general context of computer-executable instructions, such as program modules, being executed by a personal computer. Generally, program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Moreover, those skilled in the art will appreciate that the invention may be practiced with other computer system configurations, including hand-held devices, multiprocessor systems, microprocessor-based or programmable consumer electronics, network PCs, minicomputers, mainframe computers, and the like. The invention may also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

With reference to FIG. 5, an exemplary system for implementing the invention includes a general purpose computing system in the form of a conventional personal computer 20, including a processing unit 121, a system memory 122, and a system bus 123 that couples various system components including the system memory to the processing unit 121. The system bus 123 may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. The system memory includes read only memory (ROM) 124 and random access memory (RAM) 125. A basic input/output system 126 (BIOS), containing the basic routines that help to transfer information between elements within the personal computer 20, such as during start-up, is stored in ROM 124. The personal computer 20 further includes a hard disk drive 127 for reading from and writing to a hard disk, not shown, a magnetic disk drive 128 for reading from or writing to a removable magnetic disk 129, and an optical disk drive 130 for reading from or writing to a removable optical disk 131 such as a CD ROM or other optical media. The hard disk drive 127, magnetic disk drive 128, and optical disk drive 130 are connected to the system bus 123 by a hard disk drive interface 132, a magnetic disk drive interface 133, and an optical drive interface 134, respectively. The drives and their associated computer-readable media provide nonvolatile storage of computer readable instructions, data structures, program modules and other data for the personal computer 120. Although the exemplary environment described herein employs a hard disk, a removable magnetic disk 129 and a removable optical disk 131, it should be appreciated by those skilled in the art that other types of computer readable media which can store data that is accessible by a computer, such as magnetic cassettes, flash memory cards, digital video disk, Bernoulli cartridges, random access memories (RAMs), read only memories (ROM), and the like, may also be used in the exemplary operating environment.

A number of program modules may be stored on the hard disk, magnetic disk 129, optical disk 131, ROM 124 or RAM 125, including an operating system 135, one or more application programs 136, other program modules 137, and program data 138.

A user may enter commands and information into the personal computer 20 through input devices such as a keyboard 140, pointing device 142, and tag readers 18. Preferably, a plurality of tag readers 18, which are distributed throughout the pharmacy are integrated with a switching device 36 that periodically monitors the status of each tag reader 18 and transmits that information to the personal computer 20. Other input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner, or the like.

These and other input devices are often connected to the processing unit 121 through serial port interface 146 that is coupled to the system bus, but may be connected by other interfaces, such as a parallel port, game port or a universal serial bus (USB). A display 22 or other type of display device is also connected to the system bus 123 via an interface, such as a video adapter 148. In addition to the monitor, personal computers typically include other peripheral output devices (not shown), such as speakers and printers.

The personal computer 20 may operate in a networked environment using logical connections to one or more remote computers, such as a remote computer 149. The remote computer 149 may be another personal computer, a server, a router, a network PC, a peer device, a personal digital assistant ("PDA"), or other common network node, and typically includes many or all of the elements described above relative to the personal computer 20, although only a memory storage device 150 has been illustrated in FIG.7. The logical connections depicted in FIG 7 include a local area network (LAN) 151 and a wide area network (WAN) 152. Such networking environments are commonplace in offices, enterprise-wide computer networks, intranets and the Internet.

When used in a LAN networking environment, the personal computer 20 is connected to the local network 151 through a network interface or adapter 153. When used in a WAN networking environment, the personal computer 20 typically includes a modem 154 or other means for establishing communications over the wide area network 152, such as the Internet. The modem 154, which may be internal or external,

is connected to the system bus 123 via the serial port interface 146. In a networked environment, program modules depicted relative to the personal computer 20, or portions thereof, may be stored in the remote memory storage device. It will be appreciated that the network connections shown are exemplary and other means of establishing a communications link between the computers may be used.

Preferably, a plurality of networked personal computers 20 are positioned within the pharmacy, one at the intake area (Z1, Fig. 1), one at the customer pick-up area (Z9, Fig. 1), and one at the data entry/label area (Z2, Fig. 1).

G. Exemplar Automated Verification Program

The information collected and compiled by the computer system 20 can be used to verify that the correctly prescribed drug in a supply container 31 has been dispersed to a prescription container 33. A block diagram of an exemplar process and application performing this function is shown in Fig. 6.

The detailed description which follows is represented largely in terms of processes and symbolic representations of operations by conventional computer components, including a processing unit, memory storage devices for the processing unit, and a display device. These operations include the manipulation of data bits by the processing unit and the maintenance of these bits within data structures resident in one or more of the memory storage devices. Such data structures impose a physical organization upon the collection of data bits stored within memory and represent specific electrical or magnetic elements. These symbolic representations are the means used by those skilled in the art of computer programming and the construction of computing devices to most effectively convey teachings and discoveries to others skilled in the art.

For purposes of this discussion, a process is generally a sequence of steps executed by a computing device leading to a desired result. These steps generally require physical manipulations of physical quantities. Usually, although not necessarily, these quantities take the form of electrical, magnetic, or optical signals capable of being stored, transferred, combined, compared, or otherwise manipulated.

It is conventional for those skilled in the art to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, records, files or the like. It should be kept in mind however, that these and similar terms should be associated with appropriate physical quantities for computing device operations, and that these terms are merely conventional labels applied to physical quantities that exist within and during operation of the computing device.

It should also be understood that manipulations within the computing device are often referred to in terms such as adding, comparing, moving, etc. which are often associated with manual operations performed by a human operator. The operations described herein are machine operations performed in conjunction with a human operator or user that interacts with a control device. The machines used for performing the operation of the preferred embodiment of the present invention, as will be understood, include a control device and other suitable input devices.

In general, in step C1, a pharmacy worker receives within the pharmacy a supply container containing a supply of a drug. A unique tag 16b is secured to the supply container 31 in step C2, the tag is uniquely coded to identify the drug within the container.

Similarly, in step C3, a pharmacy worker receives a prescription order from a customer and assigns a unique tag 16b to that customer's prescription order. The tag is uniquely coded to correlate it with data on the customer and his prescription order such as the customer's information and the identity of the prescribed drug (step C4). The customer information may be stored in the computer system's memory or the memory of tag 16b.

When a pharmacy worker seeks to disburse a drug from a supply container 31 to a prescription container 33, he or she performs the task in an interrogation zone 35 (Step C5). Accordingly, tag 16a and tag 16b occupy the same interrogation zone 25 as shown in Fig. 1.

If the identified drug associated with tag 16a differs from the identified drug associated with tag 16b, the computer system or tag 16a alert a pharmacy worker of

the discrepancy (step C6), for example, by activating a transducer on tag 16a, such as lighting a red light 17a of initiating a tone from the speaker 17b. Alternatively, if the identified drug associated with tags 16a, 16b are the same, the computer system 20 or tag 16a can alert a pharmacy worker that the prescription order has been verified, for example, by activating another transducer on the tag, such a lighting a green light 17a (step C7). If the prescription order is verified to be correct, it may then be stored for customer pickup (step C8).

In view of the wide variety of embodiments to which the principles of the invention can be applied, it should be apparent that the detailed embodiments are illustrative only and should not be taken as limiting the scope of the invention. Rather, the claimed invention includes all such modifications as may come within the scope of the following claims and equivalents thereto.